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Energy Management Fuels Efficiency

Increasing fuel prices are causing me to reflect on how the future of our industry is intimately linked to fuel prices. A 1980 National Academy of Science committee report suggests that world production of oil and gas is expected to peak by the end of the 20th century (Hubberts Peak), followed by increased prices and strained reserves.

Environmentally, there are additional costs associated with carbon emissions from gas-powered equipment. Ten years ago, scientists from around the world gathered at the Intergovernmental Panel on Climate Change and concluded that the earth's temperature will increase a few degrees in the next decade. This point of view was initially considered controversial without significant scientific support. However, a host of recent measurements have supported the conclusion that the earth is warming.

For these reasons, the turf industry should be aware of the economic and environmental aspects of fuel consumption.

An Energy Sink

A chapter in the 1992 *Turfgrass Monograph* from the American Society of Agronomy reviewed the issue of energy use and turfgrass maintenance. The authors suggest that the excesses of having to fertilize and spray turfgrass for lush green carpets and the futility of having to mow weekly to maintain such conditions are only one side of the fuel issue.

The contention is there is a great need for the industry to always strive to reduce the use of nonrenewable energy (fuel), improve the public's understanding of the benefits of turf, and recognize that little information exists on the costs and benefits of turf.

Technological advances in the areas of mowing, fertilization, irrigation, and pest control have been emphasized, though without recognizing the energy associated with each practice. In the last several decades, mowing equipment has been used more extensively and more frequently, including mowing putting greens seven days a week, sometimes twice or three times per day. Petroleum-based synthetic pesticides and fertilizers as well as plastic irrigation equipment are common and enable us to have higher quality turf.

A Florida study from 1974, published in the *Journal of Environmental Systems*, found that compared with all other managed turfgrass areas (sports fields, home lawns, corporate parks, airports), golf courses have the highest costs per unit area from both an economic and energy perspective. This was confirmed in a California study published in the journal *Ecology*, where energy costs were determined. In that study, the total energy use was similar to the Florida study, however, almost 70 percent of all the energy used for turf management was for irrigation.

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A Healthy Ecosystem

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CORNELL Turfgrass

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Food and Pests

During the mid-1970s, the price of ammonia used for fertilization more than doubled. As a result, fertilizer prices also increased. In fact, fertilizers might have twice the energy per dollar value as the equipment used to manage a golf course. Even though much less is spent on fertilizers compared to a $25,000 mower, the energy needed to produce the fertilizer based on what you pay for it is considerably higher than the energy that the equipment consumes.

Clearly, reducing the use of fertilizer has direct energy savings, but also indirect savings by reducing turf growth that would require additional mowing. Also, proper timing of application to promote color, and turf health without stimulating top growth, is an important energy-saving measure that would include the use of iron for improved turf color.

Pesticide manufacturing is the highest energy-consuming practice on a weight basis of all agricultural inputs. In fact, the energy for production is two to four times greater than that for fertilizers. This includes the production of the active ingredient and the energy used for formulating the product, often with a petroleum-based formulant.

However, the high level of activity at low amounts of active ingredient needed to get the desired results and benefit of selectivity (killing pests, but not grass) provide other benefits that could reduce energy use, such as for weed control that would require enormous amounts of labor and energy.

Crucial in the pesticide and energy-use discussion are intensive preventive strategies, especially for insecticide use. This argues strongly for a more Integrated Pest Management approach to soil insect control, one that emphasizes cure rather than prevention. This effort alone could save substantial energy on many courses with the increased use of preventive materials such as imidacloprid (Merit).

Energy Conservation

Very little research has been conducted on energy-conserving turfgrass management. We are generally engaged in pest control and other measures that produce improved turfgrass quality and aesthetics. In the industry, how many turf managers take the time to review annual maintenance for fuel/energy use?

Records like this might reveal how much energy use has increased over the years as more golfers are on the course. At this point, the additional cost for energy might not be prohibitive. But at some point it might.

Audubon International includes energy efficiency as a component of its Cooperative Sanctuary and Signature Programs. These programs not only look at the golf course, but at the entire facility management. This is an important clarification when viewing energy costs and evaluating efficiency in budgets between the clubhouse and the course. Nevertheless, there are significant challenges and opportunities ahead in the area of energy efficiency.

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